

Date: Thursday, 21/05/2009 11:20:38 AM
 User: Julie Dawson

Process Sheet

Customer :	CU-DAR001 Dart Helicopters Services	Drawing Name :	212 X-TUBE ,LOW STANDARD FWD
Job Number :	48094		
Estimate Number :	13018		
P.O. Number :		Part Number :	D212664107
This Issue :	21/05/2009	S.O. No. :	
Prsht Rev. :	NC	Drawing Number :	D212-664-147 REV A
First Issue :	/ /	Project Number :	N/A
Previous Run :	47370	Drawing Revision :	A
	Type :	Material :	
	CROSSTUBES	Due Date :	12/06/2009
Written By :		Qty:	1
Checked & Approved By :	JLD 09.05.21	Um:	Each
Comment :	Est Rev:A 07.09.12 New Issue EC verified by: JLM Est Rev:B 08-01-11 ECN 1100 DD verified by: EC Est Rev:C 08-02-25 Ecn 1121 DD Verified by:ec Est Rev: D 09-05-14 Comments revised at step 7, QC4 rmv from step 30 KJ Verified by:		

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0	DC	DOCUMENT CONTROL
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HJ for JLD 09/06/15



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D212-664-107 CHG001.

Sos 06/17

2.0	PACKAGING 1	PACKAGING RESOURCE #1
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Comment: PACKAGING RESOURCE #1

3.0	D212664107TRN	Crosstube Turning Detail
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Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch *B-48200*

MB 09-06-01

①

4.0	BENDING	BENDING MACHINE - SKIDTUBES
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Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

MB

09-06-02

①

5.0	QC15	DIMENSIONAL CHECK OF X-TUBES
-----	------	------------------------------



Comment: DIMENSIONAL CHECK OF X-TUBES

Sos 06/02

①

W/O:		WORK ORDER CHANGES					
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6.0	D36591	CUFF
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Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

CUFF

Batch: 37426

45090602

7.0	CROSSTUBES	CROSSTUBES RESOURCE 1
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Comment: LANDING GEAR RESOURCE 1

1- Cut tube as per QC15 inspection dwg: D212-664-107.

2-Drill Rivet holes as per Dwg D212-664-147 using DT8972.

3-Drill pilot holes in tube as per Dwg D212-664-147

4-Ream hole to finish size in tube as per Dwg D212-664-147

5-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-147

6-Scribe part # and batch # using vibrating stylus as per Dwg D212-664

mb 09-06-02 ①

AWM 9-6-3 ①

mb 09-06-02 ①

8.0	HAND FINISHING1	HAND FINISHING RESOURCE #1
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Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube & Cuffs as per QSI 005 4.1

AWM 9-6-3

①

9.0	QC3	INSPECT POWDER COAT/CHEMICAL CONVERSION
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Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

S 09/06/03 ④

10.0	QC5	INSPECT WORK TO CURRENT STEP
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Comment: INSPECT WORK TO CURRENT STEP

S 09/06/03 ④

11.0	OUTSIDE SERV.10	OUTSIDE SERVICES -skids
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Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: 8932 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

CX09106108 ①

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Job Number: 48094

Part Number: D212664107

Job Number:



Seq. #:	Machine Or Operation:	Description :
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12.0	PACKAGING 1	PACKAGING RESOURCE #1
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Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

9/6/8 (1)

13.0	QC5	INSPECT WORK TO CURRENT STEP
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Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

IT 09-06-10

14.0	CROSTUBES	CROSTUBES RESOURCE 1
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Comment: LANDING GEAR RESOURCE 1

1-Rivet Cuffs as per Dwg D212-664-147. with Sika flex in Between tube & Cuff

A/R SIKAFLEX -241/-291 BATCH:

107534 111557

IT 09.06-10

15.0	CR3212406	CHERRY RIVET
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Comment: Qty.: 44.0000 Each(s)/Unit Total : 44.0000 Each(s)

CHERRY RIVET

Batch: *107534*

IT 09-06-10

16.0	SPRAY PAINTING	SPRAY PAINTING
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Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

PRIME:

Start Time: *10:30*

Finish Time: *12:00*

PAINT:

Start Time: *3:40*

Finish Time: *4:25*

m 09 06 10 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Job Number: 48094

Part Number: D212664107

Job Number:



Seq. #:	Machine Or Operation:	Description :
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17.0	QC14	INSPECT SPRAY PAINT
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Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

RT 09-06-11

18.0	D28931	2.75 Support
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Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)
Support B43479

ml 09 06 11

19.0	D3595063450	RUBBER CUSHION
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Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)
Rubber Cushion
Batch: 43210

ml 09 06 11

20.0	MS2192025	Clamp(per MIL-DTL-8783C)
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Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)
Clamp
Batch: 111883

ml 09 06 11

21.0	CROSSTUBES	CROSSTUBES RESOURCE 1
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Comment: LANDING GEAR RESOURCE 1

1- Assemble as per Dwg D212-664-147

2- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

3- Instal support with magnobond 6398 per dwg D212-664-147,
cure for 12hrs before packaging.

Time & date of application: 1:00pm 09.06.11

Batch: 111249

EXP. DATE 02/2010

Torque: ml 09 06 12 ①

ml 09 06 11 ①

22.0	QC5	INSPECT WORK TO CURRENT STEP
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Comment: INSPECT WORK TO CURRENT STEP

090612 ①

W/O:		WORK ORDER CHANGES					
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Job Number: 48094

Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

23.0

AN635A

BOLT



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

BOLT

batch M111605

9/6/15

SP

24.0

AN636A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

batch M110387

9/6/15

SP

25.0

MS21042L6

Nut



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

Nut

batch M110002

9/6/15

SP

26.0

AN960JD616

Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)

Washer

batch M111607

9/6/15

SP

27.0

D34281

Placard



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Placard

batch B47310

9/6/15

SP

28.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

582106/17

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Identify and pack for shipping as per PPP D212.664-107

Rev B 9/6/17

1x SP

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Job Number: 48094

Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

30.0

QC21

FINAL INSPECTION/W/O RELEASE



09/06/17 *[Signature]*

Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



MF 09-06-17

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

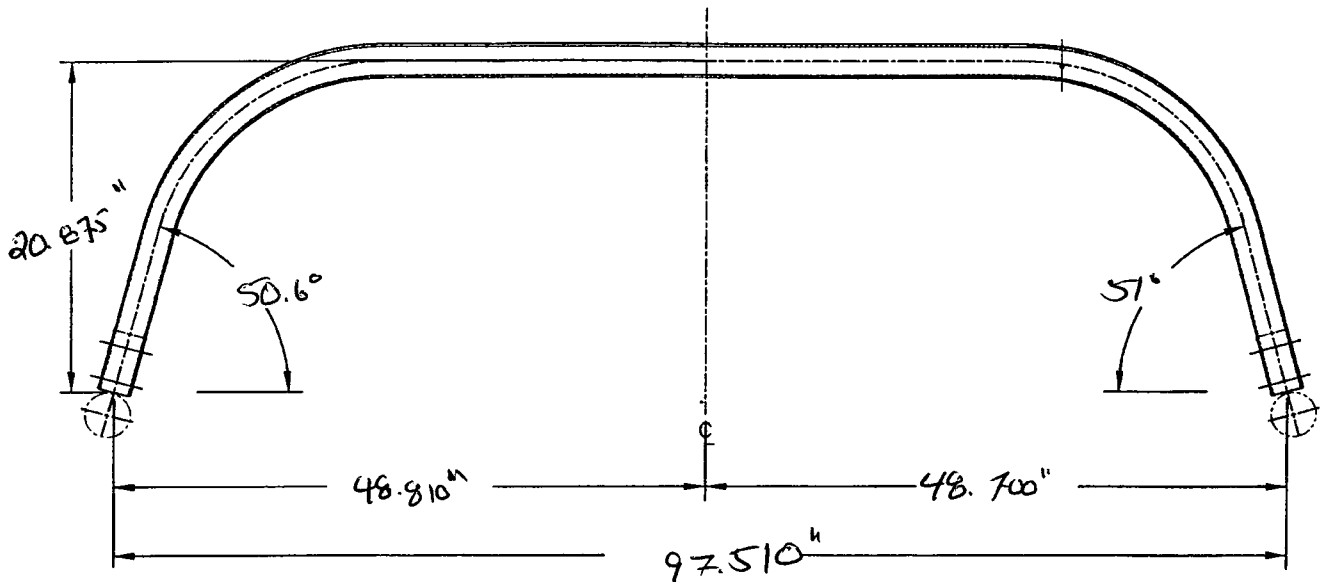
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DART AEROSPACE LTD		Work Order:	48094
Description: Crosstube Low Fwd (205/212/412)		Part Number:	D212-664-107
Inspection Dwg: D212-664-147 Rev: A		Page 1 of 1	

Required Dimension	Min	Max
Height	20.79	21.05
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62



Comments

QC15 Inspection	S
Date	09/06/02

Rev	Date	Change	Revised by	Approved
A	08.02.29	New Issue	KJ/JM	<i>[Signature]</i>

W/O:		WORK ORDER CHANGES					
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PARTS LIST:

Qty	Part Number	Description
X	D212-664-147	CROSSTUBE ASSEMBLY (205/212/412 LOW FWD)
1	D6019-128	CROSSTUBE
2	D2893-1	SUPPORT
4	D3595-063-450	RUBBER CUSHION
2	D3659-1	CUFF
4	MS21920-25	CLAMP (OR MS21920-26)
44	CR3212-4-06	RIVET (OR M7885/3-4-06)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6019-128
FINISHED LENGTH = 126.53±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) ALL DIMENSIONS ARE IN INCHES
- 5) PART IS SYMMETRIC ABOUT CENTERLINE.
- 6) WHEN MACHINING TAPER, RUN-OFF PART AT STOCK. BLEND OUT EDGE LONGITUDINALLY.
TRANSITION SHOULD BE SMOOTH.
- 7) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE
TO BENDING IS 6% BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- 8) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 9) SCRIBE DART PART NUMBER AND BATCH NUMBER ON INNER SURFACE OF TUBE WITH A
VIBRATING STYLUS.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS
SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT
LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1
THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER
INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE
D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE
CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY
AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 14) INSTALL D3659-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A
LAYER OF SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN
CUFF AND CROSSTUBE. SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 15) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

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07.07.07

NO. 17084
WORK ORDER
SUBJECT TO AMENDMENT
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A		07.07.07	NEW ISSUE	
DESIGN	qp	DRAWN BY	qp	DART DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
CHECKED	qp	APPROVED	-H	
DATE	07.07.07	DRAWING NO.	D212-664-147	
		TITLE	CROSSTUBE (205/212/412 LOW FWD) NTS	
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		REV. A	SHEET 1 OF 3	SCALE

Dart Aerospace Ltd

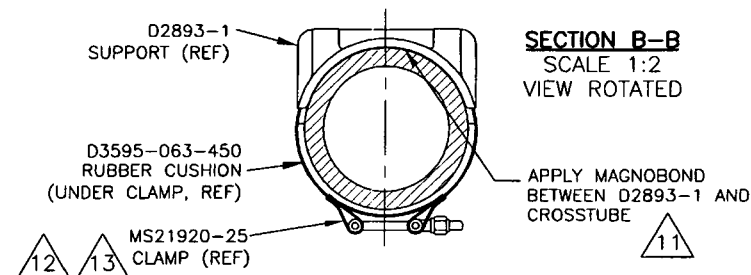
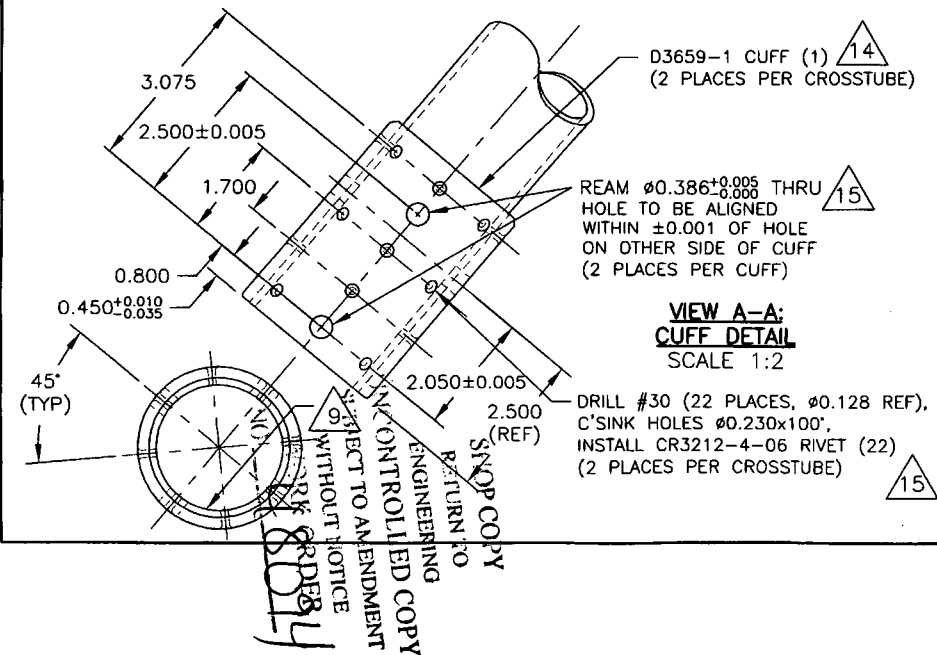
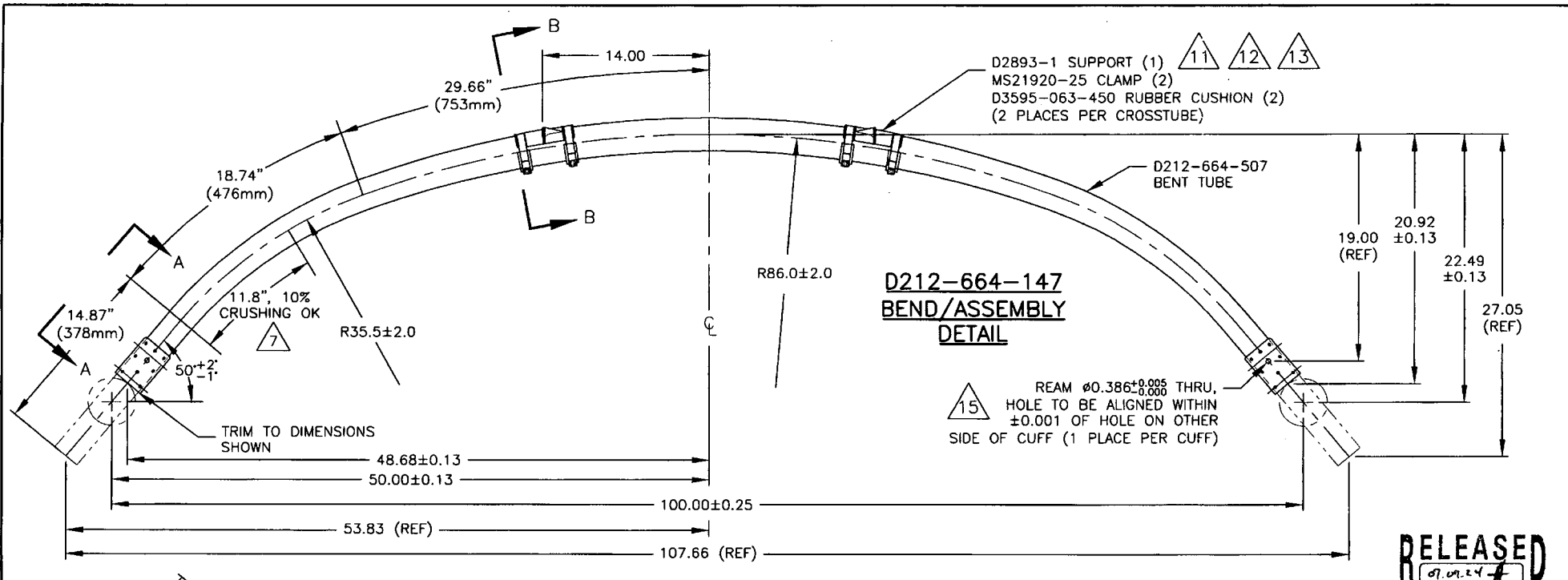
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		DATE		D212-664-147	SHEET 2 OF 3
		07.07.07		TITLE	SCALE
				CROSSTUBE (205/212/412 LOW FWD)	1:8

Dart Aerospace Ltd

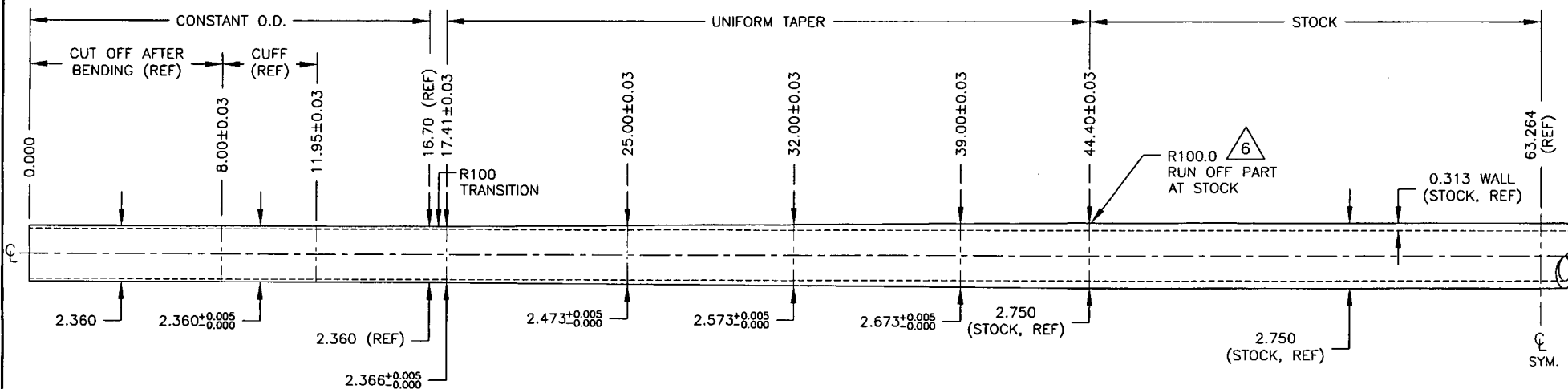
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D212-664-147 MACHINING DETAIL

RELEASED
07.07.07

NO. 205/212/412
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ENGINEERING
RETURN TO
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DATE 07.07.07		TITLE CROSSTUBE (205/212/412 LOW FWD)		SCALE 1:4	

W/O:		WORK ORDER CHANGES					
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LIQUID PENETRANT TEST REPORT

P- 14940

CLIENT	<u>DART AEROSPACE</u>	DATE	<u>JUNE 8-2009</u>	PAGE	<u>1</u>	OF	<u>1</u>
ATTENTION	<u>LINDA / CHANTEL</u>	ACUREN JOB No.	<u>188-09-001453</u>	TIME	AM <input checked="" type="checkbox"/>	PM	<input type="checkbox"/>
ADDRESS	<u>1270 ABELDEEN ST.</u>	PO/VO No.	<u>8932</u>				
	<u>HAWKESBURY ON, KGH. 1K7</u>	WORK LOCATION	<u>HAWKESBURY, MAW SHOPS.</u>				
PROJECT	<u>F.P.I. ON CROSS TUBES.</u>	ACCEPTANCE STD.	<u>ASTM 1417</u>	REV./DATE	<u>2007</u>		
ITEM(S) EXAMINED	<u>4 PCS</u>						

JOB DESCRIPTION	PROCEDURE No. LT-XXXX REV./DATE	TECHNIQUE No. LT-XXXX-XXX REV./DATE
PART NO.	MATERIAL	THICKNESS
SCOPE	<u>WET FLOWESCENT LIQUID PENETRANT INSPECTION.</u>	
	<u>CARRIED OUT 100% EXTERNAL</u>	

TEST DETAILS	
METHOD <input checked="" type="checkbox"/> FLUORESCENT <input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH <input type="checkbox"/> SOLVENT REMOVABLE <input type="checkbox"/> POST EMULSIFIED
FAMILY BRAND <u>MAGNAFLUX</u>	BLACK LIGHT S/N <u>16459</u> <input checked="" type="checkbox"/> OUTPUT > 1000 μ W/cm ² <input type="checkbox"/> AMBIENT < 2 fc
PENETRANT <u>2L 07</u> MINIMUM DWELL TIME <u>45</u> MIN.	LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT <input type="checkbox"/> OUTPUT > 100 fc @ SURFACE
PENETRANT REMOVER <u>H2O</u> MINIMUM DRY TIME <u>>10</u> MIN.	OTHER
DEVELOPER <u>SKD 52</u> MINIMUM DWELL TIME <u>10</u> MIN.	LIGHT METER S/N
DEVELOPER TYPE <input checked="" type="checkbox"/> NON AQUEOUS <input type="checkbox"/> AQUEOUS <input type="checkbox"/> DRY	CAL DUE DATE <u>Dec. 8, 2009</u>

TEST SURFACE	
SURFACE CONDITION <input type="checkbox"/> AS GROUND <input type="checkbox"/> AS WELDED <input type="checkbox"/> MACHINED <input type="checkbox"/> SHOT BLASTED <input checked="" type="checkbox"/> CLEAN BARE METAL	
SURFACE TEMPERATURE <input type="checkbox"/> < -4°C/ 20°F <input type="checkbox"/> -4°C/ 20°F TO 10°C/50°F <input checked="" type="checkbox"/> 10°C/50°F TO 52°C/125°F <input type="checkbox"/> > 52°C/125°F	

RESULTS- <input type="checkbox"/> METRIC <input type="checkbox"/> IMPERIAL			
ITEM	COMMENTS	ACCEPT	REJECT
	<u>Job #3</u>		
1-	<u>48293.</u>	<input checked="" type="checkbox"/>	
1-	<u>48295</u> <u>25</u>	<input checked="" type="checkbox"/>	
1-	<u>48094</u> <u>09-06-10</u>	<input checked="" type="checkbox"/>	
1-	<u>48095</u>	<input checked="" type="checkbox"/>	
<u>Four ITEMS WERE FOUND ACCEPTABLE.</u>			

Scope of Services
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES		DTR # <u>E-27918</u>
CLIENT REPRESENTATIVE <u>Law Titley</u>	<u>[Signature]</u> SIGNATURE	
TECHNICIAN (SIGNATURE): <u>[Signature]</u>		REPORT REVIEWED BY:
NAME (PRINT): <u>Mike Johnston</u>		NAME INITIALS
CGSB LEVEL <u>II</u> SNT LEVEL	CGSB LEVEL SNT LEVEL	
CGSB REG. NO <u>6066</u>	CGSB REG. NO	

WHITE - CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY